



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/040,055 | 12/31/2001 | James K. Falbo | NTI-030 | 1929 |

29477 7590 10/16/2003

NUMERICAL
C/O BEVER HOFFMAN & HARMS, LLP
2099 GATEWAY PLACE
SUITE 320
SAN JOSE, CA 95110-1017

EXAMINER

ROSSOSHEK, YELENA

ART UNIT PAPER NUMBER

2825

DATE MAILED: 10/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/040,055

Applicant(s)

FALBO ET AL.

Examiner

Helen B Rossoshek

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-32, 34-36 and 44-54 is/are rejected.
- 7) ☒ Claim(s) 11, 33 and 37-43 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 5. 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claims 25-55 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 25-55 have to be renumbered as 24-54 respectively and further dependency of these claims has to be changed according to new numbers. This office action is based on new numbering.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-10, 12-32, 34-36 and 44-54 are rejected under 35 U.S.C. 102(e) as being anticipated by Agrawal et al. (US Patent 6,523,162).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

Art Unit: 2825

the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

As to claims 1, 12 and 32 Agrawal et al. teaches performing a layout beautification operation on an integrated circuit (IC) layout comprising a plurality of polygons, comprising applying a first action to a first portion of the IC layout responsive to determining that a first shape associated with the first action matches the first portion of the IC layout, the first shape comprising at least a first edge and a second edge related according to a defined property, the first shape being configured to match a first type of layout imperfection wherein the layout features comprises the polygon or groupings of polygons representing the layout imperfection (col. 14, ll.20-31); defining a plurality of shapes, each of the plurality of shapes comprising at least first edge and a second edge related according to at least one of a plurality of defined properties, each of the plurality of shapes matching at least one of the plurality layout imperfections as shown on the Fig.4a-Fig.4c; defining a plurality of actions to correct the plurality of layout imperfections, each of the plurality of actions being associated with at least one of the plurality of shapes (col. 8, ll.49-59); and applying the plurality of actions to the IC layout responsive to the at least one of the plurality of shapes associated with each of the plurality of actions matching elements within the IC layout (col. 8, ll.59-61); a software program comprising: a first set of instructions for comparing a first shape to the plurality of features in each of the plurality of polygons to identify a first set of matching layout features, the first shape comprising at least a first edge and second edge related according to a first property; and a second set of instructions for performing a first layout

Art Unit: 2825

beautification action on each of the first set of matching layout features (col. 14, ll.20-31; col. 8, ll.39-42).

As to claims 2-10 and 34-36 Agrawal et al. teaches the first action comprising adjusting the first type of layout imperfection by a fixed amount as shown on the Fig. 9c (col. 10, ll.65-67); the first type of layout imperfection covers a plurality of actual layout imperfections, each of the plurality of actual layout imperfections having a different set of actual properties, wherein the first action comprises making an adjustment according to the set of actual properties for each of the plurality of actual layout imperfections according the catalog of shapes and specified actions (as functions of the properties of the shapes) listed in the Table 2 (col. 14, ll.24-27); the first action comprises replacing the first type of layout imperfection with a second shape within the bias table containing a set of actions based on a catalog of shapes (col. 10, ll.37-47); the first edge and the second edge are not contiguous (col. 14, ll.43-45; col. 18, ll.33-34); the IC layout comprises a first layer and a second layer, the first edge being associated with the first layer, and the second edge being associated with the second layer (col. 3, ll.30-32); first layer comprises a gate layer, and wherein the second layer comprises a wire layer (col. 7, ll.27-28; 35-37; 39-40); defined property specifies a plurality of alternative relationships between the first edge and the second edge by using wildcard as shown on the Fig. 7d (col. 8, ll.18-21; ll.25-26; col. 14, ll.21-23); the second edge being contiguous with and substantially perpendicular to the first edge, and wherein the first shape further comprises a third edge, the third edge being contiguous with and substantially perpendicular to the second edge, the third edge being substantially

Art Unit: 2825

parallel to and side-by-side with the first edge (col. 16, ll.64-67; col. 17, ll.1-4); the second edge being contiguous with and substantially perpendicular to the first edge, and wherein the first shape further comprises: first edge, the third edge being contiguous with and substantially perpendicular to the second edge, wherein the third edge is not substantially side-by-side with the first edge as shown on the Fig. 6e and Fig. 7d; a fourth edge, the fourth edge being contiguous with and substantially perpendicular to the third edge, wherein the fourth edge is not substantially side-by-side with the second edge as shown on the Fig. 6e; a fifth edge, the fifth edge being contiguous with and substantially perpendicular to the fourth edge, wherein the fifth edge is substantially parallel to and side-by-side with the third edge as shown on the Fig. 6e; a sixth edge, the sixth edge being contiguous with and substantially perpendicular to the fifth edge, wherein the sixth edge is not substantially side-by-side with the fourth edge as shown on the Fig. 6e; and a seventh edge, the seventh edge being contiguous with and substantially perpendicular to the sixth edge, the seventh edge being substantially parallel to and side-by-side with the first edge as shown on the Fig. 6e.

As to claims 13-18 Agrawal et al. teaches the plurality of actions having a specified sequence, wherein any element within the IC layout to which one of the plurality of actions is applied is excluded from further applications of the plurality of actions within the process being sequential or batch mode (abstract); the specified sequence being determined according to a predefined ranking of layout imperfection criticality wherein the order of the shape matching operation is set by user (col. 4, ll.18-

Art Unit: 2825

27); applying the plurality of actions to the plurality of elements included in a first polygon in the plurality of polygons in a specified sequence within identifying the layout features of interest (polygon or groupings of polygons) (col. 3, ll.23-26; col. 4, ll.18-21); restarting the specified sequence when one of the plurality of actions is applied to one of the elements of the IC layout included in the first polygon as shown on the Fig. 8 within the loop A according the sequential actions operation (col. 10, ll.37-47); applying the first action to the IC layout responsive to the at least one of the plurality of shapes associated with the first action matching elements in the IC layout; and applying a second action to the IC layout responsive to the at least one of the plurality of shapes associated with the second action matching elements in the IC layout (col. 9, ll.46-56); applying each of the plurality of actions to a first polygon in the plurality of polygons (Fig. 5a-5d; Fig. 6e) responsive to the at least one of the plurality of shapes associated with each of the plurality of actions matching elements in the first polygon (col. 10, ll.37-47); applying each of the plurality of actions to a second polygon in the plurality of polygons responsive to the at least one of the plurality of shapes associated with the plurality of actions matching elements in the second polygon (layout feature) (col. 11, ll.26-33); initialization a lookup table, the lookup table incorporating the plurality of actions (abstract; col. 2, ll.33-34).

As to claims 19-31 Agrawal et al. teaches an input data manager for loading the IC layout data file into the system as shown on the Fig. 10a (col. 12, ll.17-22); a layout beatification engine for applying a plurality of corrective actions to the IC layout data file responsive to at least one of a plurality of shapes associated with each of the plurality of

Art Unit: 2825

corrective actions matching elements in the IC layout data file, wherein each of the plurality of shapes comprises at least a first edge and a second edge related according to at least one of a plurality of defined properties within OPC engine (1030) shown on the Fig. 10a (col. 12, ll.49-60); an output data manager for generating an output data file within (1040) shown on the Fig. 10a (col. 13, ll.30-32); within the data manager which might divide the data file (col. 12, ll.28-33; Fig. 10a); a first data file format, wherein loading the IC layout data file into the system comprises converting the first data file format into a second data file format, the layout beautification engine being configured to operate on the second data file format (col. 12, 23-27; ll.28-33; ll. 36-38; Fig. 10a); generating the output data file comprises converting the second data file format into a third data file format within the hierarchy manager (1020) shown on the Fig. 10a which might decrease the size of the file (col. 12, ll.41-48); the layout beautification engine comprises a lookup table incorporating the plurality of corrective actions within the bias table (abstract; col. 2, ll.33-34); a network connection to a remote storage location, wherein the remote storage location stores at least one of the IC layout data file and the plurality of corrective actions within the storage (1190) shown on the Fig. 11 (col. 13, ll.51-56); the plurality of corrective actions are incorporated in a lookup table (abstract; col. 2, ll.33-34).

As to claims 44 and 45 Agrawal et al. teaches identifying a shape pattern in the input layout by identifying layout features of interest (col. 12, ll.21); replacing the identified shape pattern with an alternative configuration, the alternative configuration reducing data volume within hierarchy manager (1020) shown on the Fig. 10a (col. 12,

Art Unit: 2825

II.41-48); the alternative configuration provides one of an absolute correction, an adaptive correction and a replacement correction within model-based actions (when fixed value adjustment is made), rule-based actions (when adjustment depends on actual characteristics) and shape-based actions (when action with replacement shapes) respectively (abstract).

As to claims 46-54 Agrawal et al. teaches identifying shape patterns on the layout (abstract); modifying the layout according to corrective actions associated with the identified shape patterns, wherein the corrective actions include at least one of: performing a first operation using a fixed value associated with an existing layout parameter of an identified shape pattern; performing a second operation that is a function of an existing layout parameter of an identified shape pattern; performing a third operation that replaces an identified shape pattern (col. 4, II.45-50); the first operation includes matching a dimensional specification of a design rule and the existing layout parameter (abstract); performing the first operation includes fixed biasing (abstract; col. 1, II.65-67; col. 2, II.1-3); performing the second operation includes providing a corrective action proportional to the existing layout parameter (col. 8, II.37-48); performing the second operation includes at least one of proportional biasing and negative biasing (col. 1, II.53-57; col. 2, II.7-12; col. 16, II.1-3); the replacement correction replaces the identified shape pattern with a simplified shape pattern within the hierarchy manager (1020) shown on the Fig. 10a (col. 41, II.41-48).

Allowable Subject Matter

4. Claims 11, 33 and 37-43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record does not teach a third set of instructions: the second edge being contiguous with and substantially perpendicular to the first edge, and wherein the first shape further comprises: a third edge, third edge being contiguous with and substantially perpendicular to the second edge; a fourth edge being contiguous with and substantially perpendicular to the third edge; and a fifth edge being contiguous with and substantially perpendicular to the fourth edge, wherein none of the first edge, the second edge, the third edge, the fourth edge, and the fifth edge are substantially side-by-side with each other; for defining the first shape according to a set of user inputs; for loading the first shape from across a network, for defining the first layout beatification action according to a set of user inputs; for loading the first action from across a network; for comparing a second shape to the plurality of features in each of the plurality of polygons to identify a second set of matching layout features, the second shape comprising at least a third edge and fourth edge related according to a second property; and fourth set of instructions for performing a second layout beatification action on the second set of matching layout features; the first set of instructions and the second set of instructions are completely executed before the third set of instructions and the fourth set of instructions; the first set of instructions and the second set of instructions are executed concurrently, and wherein comparing the first shape to a selected one of the plurality of

Art Unit: 2825

features in each of the plurality of polygons is performed before comparing the second shape to the selected one of the plurality of features in each of the plurality of polygons.

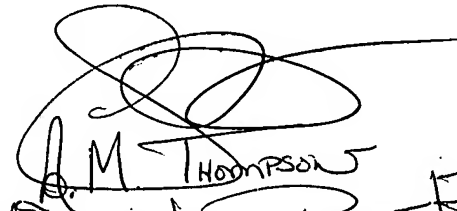
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen B Rossoshek whose telephone number is 703-305-3827. The examiner can normally be reached on 7:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on 703-308-1323. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

HR 4R


A. M. THOMPSON
MASTER'S LEVEL PATENT EXAMINER
TECHNOLOGY CENTER 2800